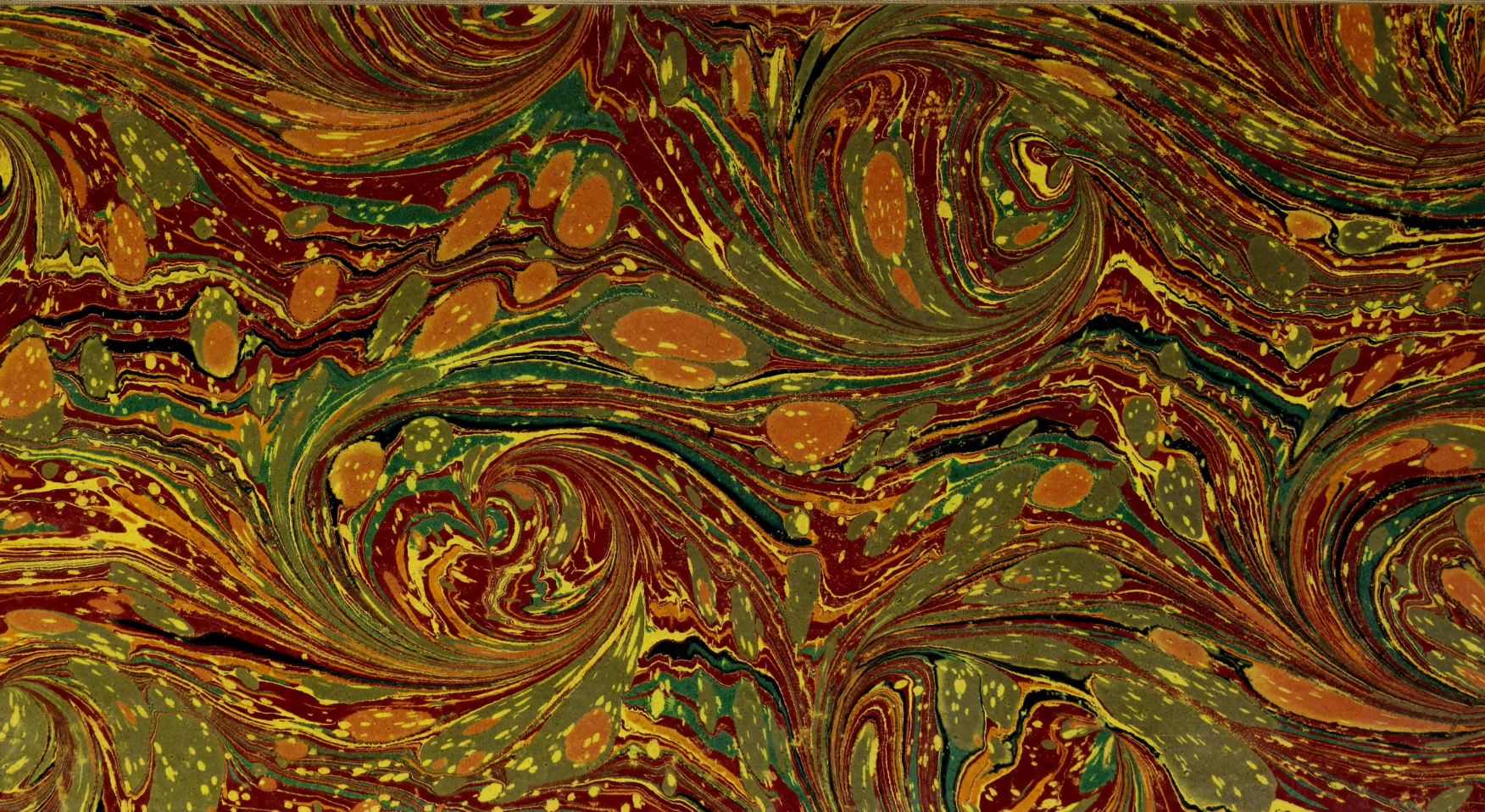

# THE RABBIT AS A FARM AND ORCHARD PEST.

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[Reprint from Yearbook of Department of Agriculture for 1907.]

WASHINGTON : GOVERNMENT PRINTING OFFICE : 1908

48626—08

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# THE RABBIT AS A FARM AND ORCHARD PEST.

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## INTRODUCTION.

The American farmer encounters many obstacles in the practice of his calling. In addition to innumerable insect enemies and plant diseases which assail his crops at every stage of growth, he has to contend against great numbers of destructive rodents. Pocket gophers, woodchucks, prairie dogs, ground squirrels, rats, mice, and rabbits levy a heavy toll upon the products of field, garden, and orchard. No actual statistics of the aggregate of annual losses due to rodent pests in the United States are available, but as early as 1861 a writer in the American Agriculturist estimated that rats alone caused losses of $10,000,000 a year in the country.[a] In Denmark the losses from rats are estimated at $3,000,000 annually;[b] while in France the total of all losses from rats and mice has been placed at $40,000,000 per year.[c] Considering the vast territory of the United States and the great numbers of her mammalian pests, the actual losses must be several times as great as they are in France.

Because of their wide distribution and great abundance, rabbits hold a prominent place among rodent pests. They are larger than rats and mice, and almost as prolific, and under some circumstances inflict upon crops and trees damages greater even than those caused by field mice.

## DISTRIBUTION OF RABBITS IN THE UNITED STATES.

Rabbits are so widely distributed throughout the United States that nearly all cultivated districts contain one or more species. They occur also in the mountains and deserts remote from agriculture; and usually, as new areas are brought under the plow, rabbits are on the ground ready to attack the settler's first crops.

The common gray rabbit, or cottontail (*Lepus floridanus* and subspecies), occurs from the southern parts of Maine, New Hampshire,

[a] American Agriculturist, 20, p. 44, 1861.
[b] Dr. Adrien Loir in Jour. d'Agri. Trop., 3, p. 369, 1903.
[c] Journ. Board Agr. Great Britain, 11, p. 50, 1904.

and Vermont southward to Florida and the Gulf of Mexico and westward to the Plains, where its range extends up the streams to the limit of trees and shrubs. Along our northern border and in the mountains the varying hare (*Lepus americanus* and subspecies) occurs, and westward to the Pacific several species of jack rabbits and smaller cottontail rabbits are found. In all, about 30 species and twice as many geographic races (subspecies) are known to inhabit North America, while the occurrence of several distinct fossil forms shows that the genus has long been established on the American continent.

### PROTECTIVE POWERS OF RABBITS.

Rabbits are apparently defenseless animals, but the senses of hearing, sight, and smell are strongly developed in them and they run with great swiftness. These powers, combined with their protective coloration, largely compensate for lack of means of defense. The ears are long and erectile; the eyes are large and prominent, and, being placed at the sides of the head, enable the animal to see in nearly all directions at the same time. The long hind legs confer great leaping power and the animals can run up or down hill with almost equal facility—a fact which gives them a decided advantage over some of their enemies. All rabbits are capable of bursts of great speed, and the large species can maintain their pace for a considerable time.

### BREEDING HABITS.

Our American rabbits are not so prolific as the common European species. Some of them produce three or four litters of young in a season, while others seem to breed but twice. The period of gestation is about thirty days, and the breeding season is from April to September or even later. The young are produced in natural depressions under rocks, stumps, or weeds, or in shallow burrows made by other animals. When these are lacking, the female scratches a shallow hole under a bunch of grass or weeds. In the hollow thus chosen or prepared she makes a nest of leaves or grasses and lines it with fur from her own body. Here the young, numbering from 2 to 7 (averaging in most of our species about 4), are produced. The young are fully furred and have their eyes open when born.

The female, while caring for her young, remains in the vicinity of the nest. If enemies approach, she runs away for a short distance; but when the young are attacked and cry out, she has been known to fight desperately in their defense, and even to vanquish such a formidable foe as a cat or a snake. When attacking, she jumps and strikes the enemy with her hind feet—members capable of a powerful blow, as many a boy who has captured a live rabbit can testify.

Young rabbits are attended and suckled in the nest for about three weeks, after which they are left to shift for themselves. Since usually succulent food is abundant, this is not a difficult task, and, subject to the vicissitudes of climate and the attacks of natural enemies, they soon adapt themselves to an independent life. Apparently the mother takes no further interest in the career of her offspring. The male parent is probably never concerned in the care of the young.

### FOOD OF RABBITS.

Rabbits are strict vegetarians, animal food never being eaten by the adults. They eat all sorts of herbage—leaves, stems, flowers, and seeds of herbaceous plants and grasses, and leaves, buds, bark, and fruit of woody plants or trees. The most succulent kinds, such as young shoots, tender garden vegetables, clover, alfalfa, and fallen ripe fruits, are generally preferred; but when these fail, any green vegetable growth seems acceptable, and the bark of trees is often resorted to when deep snows cover other supplies or during long summer droughts.

The common cottontail is fond of frequenting farms and plantations and makes its "forms" under brush heaps or in tufts of grass, bunches of weeds, briers, or bushes (Pl. XXXVII). It occupies this form, or nest, by day and at night moves about, feeding upon the succulent vegetables in the farmer's garden, or the clover, turnips, or corn in his fields. In the fall it feasts upon apples, cabbages, turnips, and the like left exposed in garden and orchard, and in winter, when all else is frozen hard or covered with snow, it turns its attention to twigs and bark of woody plants, often doing much damage to young trees.

The other species of rabbits have similar habits, varying with the environment of the animals. In the West some of the smaller kinds live largely in the abandoned burrows of prairie dogs, badgers, and other animals.

### INJURY TO FIELD CROPS.

Rabbits feed upon nearly all growing crops, but the damage to small grains is usually so slight as to pass unnoticed. Wheat and rye afford abundant pasture for rabbits during open winters, and this without apparent effect upon the yield of grain. Rabbits eat very little mature grain, except corn in winter, and this is but seldom damaged as long as green herbage can be obtained.

Clover and alfalfa are favorite foods with all our rabbits, and these crops are badly damaged by them. In the West alfalfa is the principal forage crop over considerable areas, growing often amid arid surroundings. It is green throughout the greater part of the

year, and thus furnishes a rich, succulent, and attractive food for the cottontail and jack rabbits. Where an alfalfa patch is isolated, like a small oasis in a desert, rabbits sometimes keep it pastured down, so that little if any forage can be cut. Besides eating the plants, the animals keep well-worn paths beaten through the fields.

On open western ranges, ordinarily, the rich native grasses, though often of sparse growth, furnish ample food for rabbits; and when the animals are numerous the amount of pasturage available for stock is considerably reduced. In the Southwest rabbits often eat the juicy pulp in the pads of the prickly pear (*Opuntia*) and the bark and twigs of the mesquite (*Prosopis*), and during long droughts they subsist largely upon these plants.

In the West and Southwest rabbits are destructive to watermelons and cantaloupes, eating the young plants as well as the fruit. At Laredo, Tex., H. C. Oberholser, of the Biological Survey, observed that jack rabbits had ruined an entire field of cantaloupes when the plants were about 6 inches high, and had greatly damaged a field of watermelons. At Seguin, Tex., in November, 1904, Vernon Bailey found that about 75 per cent of the watermelons in one field had been destroyed by jack rabbits, and that cantaloupes could not be grown except when protected by rabbit-proof fences.

### INJURY TO GARDENS.

Rabbits are fond of nearly all garden vegetables, but are particularly partial to peas and cabbages, eating the plants at all stages of growth, especially when small. They often invade market gardens and truck patches near towns and do much damage. Formerly, when there were few restrictions on the hunting of rabbits, boys and dogs usually kept down the numbers of the animals so that they interfered but little with market gardening. With the very short open season for rabbit shooting now provided in some States and a constantly growing tendency everywhere to "post" lands against trespassers, damages by the animals have become more serious, and truck farmers are more and more compelled to resort to close fencing as a protection.

### INJURY TO TREES.

Rabbits injure trees and shrubs in two ways—by cutting off the ends of branches and twigs within reach, and by eating the bark. Young nursery trees and forest seedlings, both evergreen and deciduous, are destroyed in the first way; while orchard and larger forest trees are badly damaged and often killed in the second way. When the trunk of a tree is attacked, the injury begins at a height of from 8 to 16 inches from the ground. The large incisors of the animals cut into the bark laterally from both sides, and a strip of bark is torn away. This is repeated until large areas of wood are

EASTERN COTTON-TAIL RABBIT (LEPUS FLORIDANUS MALLURUS).

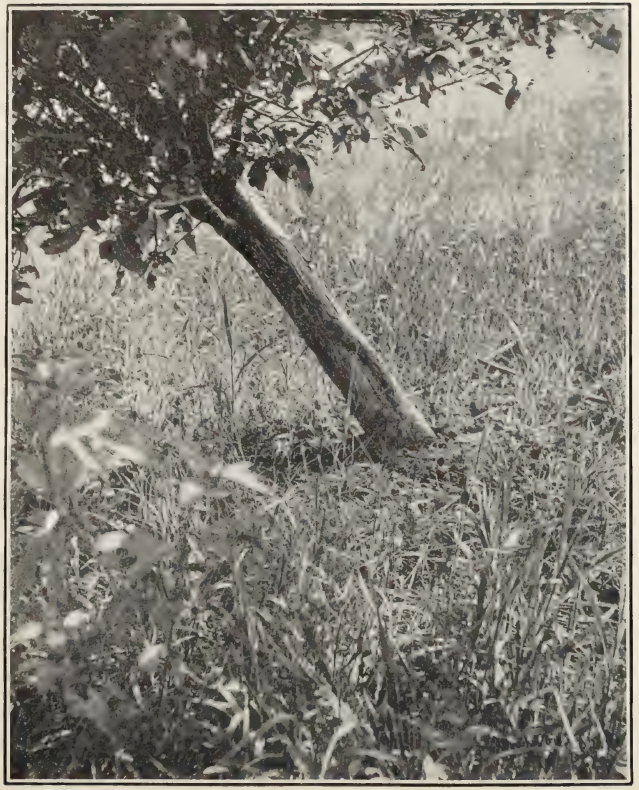

FIG. 1.—APPLE TREE INJURED BY RABBITS.

FIG. 2.—APPLE TREE INJURED BY MEADOW MICE.

uncovered, often until the tree is entirely girdled. The difference between the work of rabbits and that of field mice may easily be detected by the large tooth marks of the former and by the tearing of the bark in strips. The work of mice usually begins at or below the surface of the ground, and the fine tooth marks cover the entire surface that is denuded of bark. Mice, like rabbits, also sever twigs, but the tooth marks are small. In spite of these constant and obvious differences, many orchardists attribute to rabbits much of the damage done by mice. (Pl. XXXVIII, figs. 1 and 2.)

A list of the trees and woody shrubs whose twigs and bark are eaten by rabbits would include a large majority of our arborescent plants. Whether certain trees, like the walnut for instance, are absolutely exempt from attack is an open question. Usually the apparent immunity of a tree from the attack of rabbits is to be taken as indicating that other trees growing near it are preferred; for when an entire plantation is of a single species, its apparent immunity often disappears. Thus the incense cedar (*Libocedrus decurrens*) of California, long reputed to be exempt from attacks by rabbits, when planted by the Forest Service in the San Gabriel National Forest was badly injured by cottontail rabbits.

Newly planted orchards in most sections of the United States are liable to injury from rabbits, and few are now set out without provisions for winter protection from these animals.

### INJURY TO NURSERIES.

In many parts of the country nurseries of young fruit, forest, and ornamental trees and shrubs are subject to injury from rabbits. In some instances nurserymen report losses of from 20 to 30 per cent of their stock in a single winter, the money value reaching several thousand dollars. The losses of orchard and nursery stock in one neighborhood in Arkansas during the comparatively mild winter of 1905–6 were estimated at fully $50,000. Similar reports come from other sections. In some States the losses of nursery stock from rabbits undoubtedly are increasing from year to year.

### RABBITS IN FOREST PLANTINGS.

In Europe young forest plantations are often injured by rabbits. On the Plains of our own country, under the operation of the old timber-culture act, rabbits sometimes proved to be almost as formidable obstacles to success as drought. The Forest Service is making important progress in the work of forest extension. This work, both in cooperative and reserve plantings, is often hampered by depredations of rabbits, especially in wild country partly covered by dense chaparral, which harbors the smaller species. Depredations have been so extensive as to indicate that rabbits, both cottontails and the

larger species, are likely to prove a serious hindrance to the work of forest extension.

### THE RABBIT AS GAME.

The smaller American rabbits have long been esteemed as game. While their flesh is less tender than that of the domesticated species (Belgian and other races), it is of much finer flavor, and when properly prepared for the table is much more desirable as food. With the same care in dressing and handling bestowed upon the rabbit in English markets, our cottontail rabbit would stand much higher in popular flavor. The jack rabbits of the western Plains are not so good, the flesh, except in young animals, being somewhat coarse and dry; yet many reach our markets.

The trade in rabbits is extensive, since there are few restrictions upon their sale. They are usually both abundant and cheap, and furnish an excellent substitute for higher-priced game. Unfortunately, on account of their cheapness, little care is taken in handling and dressing them for market, and for this reason many people refrain from buying them for the table.

In the South there are few restrictions on hunting rabbits, and they can be obtained at almost any time. As a valuable source of food for the people of this section, the rabbit is of considerable economic importance.

### PROTECTIVE LEGISLATION.

The manner in which the rabbit is regarded by the people of the various States is well shown by the existence or the absence of laws for its protection. In the New England and the Middle Atlantic States the rabbit is protected, while throughout most of the West and South no restrictions are placed on hunting the animals. In some Western States they are regarded with such disfavor that bounties have been paid for their destruction. In States where they are most abundant, protection is rarely afforded. In sections of the country where a close season on rabbits is accompanied by a strict enforcement of laws against trespass by hunters, rabbits have often become so abundant that farmers have asked for a repeal of the protecting laws.

Sixteen States have laws fixing a closed season for rabbits, and in the District of Columbia, in addition to the closed season, all shooting is prohibited. Kentucky prohibits the hunting of rabbits for a short time just previous to the open season for quail, the object being to protect the birds rather than rabbits. The list on the following page shows the States which have laws for the protection of rabbits.

*Length of open season for rabbits in States which limit the time for hunting them.*

| | Length of open season.[a] |
|---|---|
| Maine | September 1 to April 1—7 months. |
| New Hampshire | October 1 to April 1—6 months. |
| Vermont | September 15 to May 1—7½ months. |
| Massachusetts | October 1 to March 1—5 months. |
| Rhode Island | November 1 to January 1—2 months. |
| Connecticut | October 1 to December 1—2 months. |
| New Jersey | November 10 to January 1—52 days. |
| New York (28 counties[b]) | Two to five months. |
| Pennsylvania | October 15 to December 1—1½ months. |
| Delaware | November 15 to January 1—1½ months. |
| District of Columbia | November 1 to February 1—3 months. |
| Maryland | November 1 to December 25[c]—54 days. |
| Virginia | Two to six months.[d] |
| West Virginia | September 15 to January 1—3½ months. |
| Ohio | November 15 to December 5—20 days. |
| Wisconsin | September 1 to March 1—6 months. |

In Ohio, where the open season is only twenty days, there is much complaint from nurserymen of loss of trees from rabbit injury. At the meeting of the State Horticultural Society, in 1897, prominent nurserymen and market gardeners complained of rabbit depredation, which seemed to be great in the neighborhood of the larger towns.[e]

It is probable that, except where the open season is very short, protection has but little effect upon their numbers. Ordinarily the animals are at their best for food during the fall and winter months, and there is a prejudice against eating them during the breeding season. Besides, during the spring and summer they are subject to parasites which often make them unfit for food.

### THE FARMER AND RABBIT PROTECTION.

The relation of the farmer to rabbit protection is rather complicated. As a rule he regards the animals as pests and is glad to have them killed, especially in the open fields; but often those engaged in the nursery business or in growing small fruits, as well as those having farm animals in pastures, object to hunting upon the premises, and therefore must depend upon their own efforts to free their holdings from rabbits. The task is the more difficult because during the shooting season their premises, if protected, become harbors for the persecuted rabbits of neighboring estates.

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[a] The open season includes the first day given but not the last.

[b] No closed season in other counties.

[c] A few local exceptions.

[d] Local laws apply to the various counties.

[e] Cultivator and Country Gentleman, 62, p. 1026, 1897.

### MEANS OF REPRESSION.

When rabbits so increase in numbers as to become a menace to crops, repressive measures become necessary, and under these circumstances the operation of such measures should not be restricted to the open season. Laws should be so modified as to permit the farmer to protect his crops by destroying rabbits upon his own premises whenever necessary. Several States already have such provisions; others do not, although permitting the orchardist to destroy insectivorous or other birds that attack his fruit, and a similar privilege in the case of a recognized pest such as the rabbit should certainly be granted.

### NATURAL ENEMIES.

Among the agencies that help to destroy rabbits none are more effective than carnivorous birds and mammals. These include large hawks and owls, eagles, wolves, coyotes, lynxes, foxes, minks, weasels, and domestic dogs and cats. The list of our birds of prey known to feed upon rabbits includes the marsh hawk (*Circus hudsonius*), the Cooper hawk (*Accipiter cooperi*), the goshawk (*Accipiter atricapillus*), the Harris hawk (*Parabuteo unicinctus harrisi*), the red-tailed hawk (*Buteo borealis* and subspecies), the red-shouldered hawk (*Buteo lineatus*), the Sennett white-tailed hawk (*Buteo albicaudatus sennetti*), the Swainson hawk (*Buteo swainsoni*), the rough-leg (*Archibuteo lagopus sanctijohannis*), ferruginous rough-leg (*Archibuteo ferrugineus*), the golden eagle (*Aquila chrysaëtos*), the bald eagle (*Haliætus leucocephalus*), the long-eared owl (*Asio wilsonianus*), the short-eared owl (*Asio accipitrinus*), the barred owl (*Syrnium varium*), the great horned owl (*Bubo virginianus*), and the snowy owl (*Nyctea nyctea*). Other smaller hawks and owls sometimes destroy young rabbits. The large species, as the eagles, the horned owl, and the buzzard hawks (*Buteo*), are the ones that prey most upon rabbits. Unfortunately, in many sections where they are needed, these birds year by year are being ruthlessly killed and are becoming rarer. With certain exceptions the same may be said of the wild mammals that destroy rabbits.

### HUNTING THE RABBITS.

On the whole, in America hunting has been the most effective means for keeping down the number of rabbits. In some parts of the country this method was carried so far that lovers of the sport were compelled to invoke legislation to protect the rabbit from extermination.

As to methods of hunting, shooting is generally preferred. Ferreting usually is impracticable, since few of our native rabbits take refuge in burrows. Moreover, the use of ferrets is forbidden by law in some States which protect the rabbit. Coursing with greyhounds

has many advocates and is popular in the West, where the swifter jack rabbits abound. Smaller rabbits are often chased with fox-hounds, but the beagle is rapidly taking precedence as a favorite for rabbit hunting, the gun being depended upon for securing the game.

### RABBIT DRIVES.

Where the country is sufficiently open for the purpose, one of the most successful methods of reducing the numbers of rabbits is the organized hunt, known as the "drive." This method has been tried in many localities in the West and in Australia with satisfactory results, the number of rabbits killed in a single drive reaching as high as 10,000 or even 20,000.

### TRAPPING THE RABBIT.

Rabbits are easily trapped and snared, and these methods of destruction although slow are always available in wood lot, orchard, nursery, field, or garden. Many of the animals are caught in box traps set with a figure-four trigger, with cord attached to hold up the box lid.

An improvement upon these old-fashioned box traps is widely used in the Central West. In Kansas and Missouri it is familiarly known as the "Wellhouse" trap, it having been used extensively in the large orchards owned and controlled by Mr. Fred Wellhouse, of Topeka, Kans. This trap is not patented, and is not on the market, but can easily be made by any farmer. The trap is a box made of 6-inch fencing boards, old ones being preferred. The box is about 21 inches long, closed at the back by a board, but in front by a wire door only. The door is hung from the top and swings inward. A cleat at the bottom prevents its opening outward. The trap is set and the wire door is kept open by a wire trigger-rod, held in place by two staples fastened to the top of the box. This trigger is bent downward near the rear of the trap and formed into a loop or a figure eight. As the rabbit enters the trap and crowds into the back part, it pushes upon the loop, moves the trigger wire backward, and releases the wire door. This falls and makes the rabbit a prisoner. Bait may be used, but is not necessary, since the cottontail is constantly looking for dark places to hide from enemies or cold winds. Mr. Wellhouse uses about three traps per acre in young orchards and many among the bearing trees. They are regularly looked after by boys, and so effective have they proved that no serious losses from rabbits have occurred in his orchards.

The materials needed for making a Wellhouse trap are: Four boards 1 by 6, 21 inches long; one piece 1 by 6, 8 inches long for the back; a short cleat for the door stop; 28½ inches of wire to serve

for the door; 22 inches of wire for the trigger; four small staples for hanging the door and trigger; and nails. (See fig. 34.)

### POISONING RABBITS.

In the West, poison for destroying rabbits has been resorted to with some success. The most favorable season for its use is in winter, or after long-continued drought has made green food scarce. In summer and early autumn grasshoppers and crickets interfere greatly with poisoning operations by consuming the baits put out for rabbits. The methods of poisoning rabbits here given are the ones best adapted for general use: Crystals of strychnia sulphate may be inserted in ripe prunes, pieces of melon rind, or apples, and these placed at intervals along rabbit runs or paths, care being taken to put them where children and domestic animals do not have

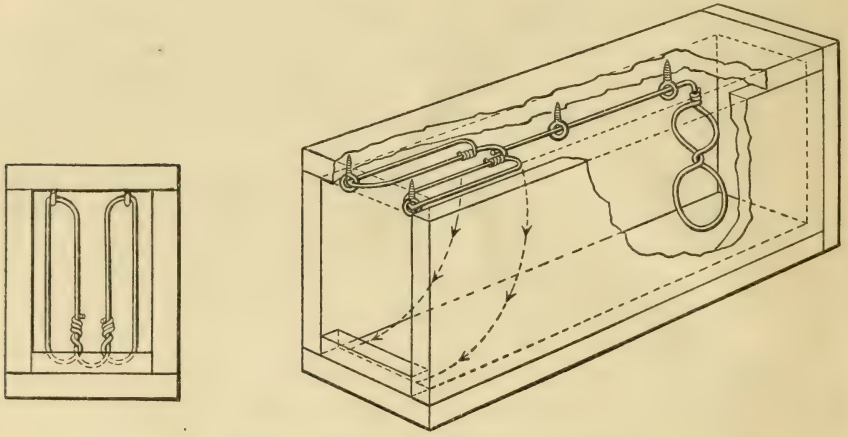

FIG. 34.—Details of Wellhouse rabbit trap.

access to them. Where no well-defined runs are visible in orchards, artificial ones may easily be made with a drag or with a one-horse scraper. Along such runs or the dead furrows of plowed fields rabbits habitually travel. The prepared baits may be placed on the ground or elevated on short sticks at intervals along the path. Baits should be looked after with care, and if any are left after poisoning operations are over they should be destroyed.

When grasshoppers are not numerous oatmeal soaked in a well-sweetened solution of strychnia is an excellent bait for rabbits. During seasons of drought, poisoned water has been used successfully to destroy rabbits. Water containing arsenic or strychnine is placed in shallow vessels and exposed along the runs. This method has been practiced in Australia, but the danger of poisoning birds is a serious objection, unless the poisoned water is put out at dark and removed or covered at daylight.

Rabbits may be poisoned in winter by baiting with twigs cut from apple trees and dipped in a solution of strychnine and sugar. These baits are scattered along rabbit paths and in cold weather are very effective. This method has the merit of being without danger to birds or other animals except rabbits or field mice.

The carcasses of poisoned rabbits, when found, should be buried, and every precaution should be taken to prevent the accidental poisoning of other animals or human beings.

### PROTECTION OF CROPS FROM RABBITS.

Complete extermination of rabbits in any part of the United States is not desirable, even were it possible. They should be reduced in numbers far enough to secure safety to crops; and before active wholesale destruction of the animals is attempted, the possibility of crop protection should be carefully considered. In many cases protection would probably be the more economical method. All known methods of destroying rabbits are expensive. This was well illustrated by the experience of the Australian colonies in dealing with the rabbit problem. Thus in New South Wales, when some 2,000 men were constantly employed in the work of destruction, the number of rabbits killed per month was upward of 600,000, but the cost was enormous. When the total of rabbits killed amounted to 7,853,787, the sum paid out for the work was about $1,757,000, or more than 22 cents for each rabbit.[a] Unless the cost can be reduced much lower than this, protection of crops is far cheaper.

### RABBIT-PROOF FENCES.

When rabbits are abundant and the area to be protected is not too great, a rabbit-proof fence may be profitably employed. Woven wire nettings are generally used for this purpose. In the Australian colonies such fences are erected by the Government to confine rabbits to certain districts, as well as by private owners to protect crops. As the Australian pest is a burrowing species—the European rabbit (*Lepus cuniculus*)—the requirements for a rabbit-proof fence differ from those necessary in this country. Even with our species there is some danger of their digging under fences, and this may be prevented either by the use of a barbed wire in contact with the ground or by plowing a furrow against the lower edge of the wire netting. A netting of galvanized wire with 1½-inch mesh and from 2 to 3 feet high is a sufficient barrier against rabbits. Many market gardeners and nurserymen use the 2-foot width; others prefer a netting 2½ feet wide, and, turning the lower edge outward

[a] Sydney Morning Herald, quoted in Cultivator and Country Gentleman, 52, p. 628, 1887.

from 4 to 6 inches, cover it with soil. Netting made of No. 20 wire costs from 20 to 30 cents per rod. Heavier netting slightly increases the cost of fencing, but adds to its durability. Where lumber is cheap, a picket fence or one made of pickets and wire combined may be substituted for the netting.

### TREE PROTECTION.

The devices that have been recommended for protecting trees from rabbits are too numerous for separate mention. The majority consist of paints, washes, or smears of various kinds, supposed to be distasteful to the animals. Unfortunately, those that are sufficiently permanent to afford protection for an entire winter often injure or even kill the trees to which they are applied. Coal tar, pine tar, tarred paper, and various oils are likely to kill young trees. Blood and animal fats when freshly applied will protect from rabbits, but are objectionable, since they are highly attractive to the destructive short-tailed field mice. Carbolic acid and other volatile substances afford only temporary protection, and must be renewed too often to justify their use. Bitter substances, like commercial aloes, or quassia, are useless against rabbits.

Among the most promising washes that have been recommended for tree protection is the "lime-and-sulphur" wash, so effective in winter for the destruction of the San Jose scale. Several correspondents of the Biological Survey have affirmed its efficacy in protecting trees from both mice and rabbits. If this cheap method of controlling our worst insect pest of the orchard has further value in protecting trees from rodents, the fact can not be too widely advertised. The results of personal observation by the writer seem to fully warrant its recommendation, and its cheapness makes the method worthy of general trial by orchardists.

The formula for the wash, reduced to the basis of the capacity of the ordinary kerosene barrel commonly used in the preparation, is:

| | | |
|---|---|---|
| Unslaked lime | pounds | 20 |
| Flowers of sulphur | pounds | 15 |
| Water to make | gallons | 45–50 |

A little salt may be added to increase the adhesive property of the mixture. The lime, sulphur, and about a third of the water are boiled together for at least one hour, and the full quantity of water is then added. For San Jose scale the wash in the form of a spray is applied to the entire surface of the trees. For protection from mice and rabbits the trunks only require treatment, and the wash may be applied with a brush. One application in November should last the entire winter.

Mechanical contrivances for protecting young orchard trees are many. Where protection from rabbits only is required, woven wire netting is recommended. This should be made of No. 20 galvanized wire, 1-inch mesh, such as is often used for poultry netting. For cottontail rabbits rolls 18 inches wide are recommended, but as a protection against jack rabbits wider material is safer. The wire is cut into 1-foot lengths, and one of these sections is rolled into shape about the trunk of each tree, the ends being brought together and fastened at several places by means of the wire ends. No other fastening is needed. The wire is not in contact with the trunk and may be left on the tree permanently. It will probably last as long as the tree requires protection, and the cost of material need not be over $1\frac{3}{4}$ cents for each tree. For young evergreens, material of the same kind 1 foot wide and cut in $1\frac{1}{2}$-foot lengths will give excellent protection.

If trees are to be protected from both rabbits and mice, materials of closer mesh must be used. Wire window-screen netting is excellent for the purpose, and the cost, when permanence of protection is considered, is not great.

Veneer and other forms of wood protectors are popular and have several advantages. When left permanently upon the trees, however, they furnish retreats for insect pests. For this reason they should be removed each spring and laid away until cold weather. While the labor of removing and replacing them is considerable, they have the advantage, when pressed well into the soil, of protecting from both mice and rabbits. They cost from 60 cents per hundred upward, and are much superior to building paper or newspaper wrappings. The writer has known instances where rabbits tore wrappings of building paper from the apple trees and in a single night injured hundreds of them. "Gunny-sack" and other cloth wrappings, well tied on, are effective protectors. Cornstalks also furnish a cheap material for orchard protection. They are cut into lengths of 18 to 20 inches, split, and tied with the flat side against the tree, so as fully to cover the trunk.

Few of these methods for the protection of individual trees in orchards or elsewhere are applicable to young woodlands or forest plantations where trees grow close together. In such cases the only remedy is destruction of the animals or their exclusion by wire nettings.

Clean cultivation, generally, has some advantages in preventing rabbit depredations, since it reduces the number of places of refuge for the animals; but rabbits go long distances in search of food, especially in winter, and clean cultivation can not be applied on the western plains, where dense wind-breaks are essential to successful orcharding.

Feeding rabbits in winter to prevent attacks upon orchards has been successfully practiced, on the theory that it is cheaper to feed than to fight them. One plan is to leave the winter prunings of apple trees scattered about the orchard. Another is to furnish corn, cabbage, or turnips in sufficient quantities to feed the rabbits during cold weather. These methods have considerable merit, particularly the former, which seems to give excellent results when both mice and rabbits are present.

O